

ACIDS AND BASES

Many common pure substances can be classified according to whether they are acids or bases. **Acids produce hydrogen ions (H^+) and bases produce hydroxide ions (OH^-).**

The concentration of hydrogen ions refers to the number of hydrogen ions in a specific volume of solution. Solutions with a high concentration of hydrogen ions are highly acidic. Similarly, solutions with a high concentration of hydroxide ions are highly basic. When an acidic solution is mixed with a basic solution, the solutions can neutralize each other, which means that the acidic and basic properties are in balance.

WHAT IS pH?

Testing the pH of a solution is a way of measuring its concentration of hydrogen ions, $\text{H}^+(\text{aq})$. The pH scale is a number scale that indicates how acidic or basic a solution is. **Acids have a pH below 7 and bases have a pH above 7. Neutral solutions have a pH of 7.** On the pH scale, one unit of change represents a 10-fold change in the degree of acidity or basicity. For example, a two unit drop in pH is a 10^2 , or 100 times increase in acidity.

pH indicators are chemicals that change colour depending on the pH of a solution, such as, litmus paper, universal indicators, phenolphthalein, bromothymol blue, indigo carmine, methyl orange and methyl red.

NAMING ACIDS AND BASES

Generally, the chemical formula for an acid starts with H (hydrogen) on the left hand side of the formula. Acids can be named in several ways.

Many compounds take on acidic properties only when mixed with water. If no state of matter is given, the name may begin with hydrogen, as in hydrogen chloride (HCl). However, if the same acid is shown as being aqueous, HCl(aq) (dissolved in water), a different name may be used – one that ends in –ic acid, as in hydrochloric acid.

Names that begin with hydrogen and end with the suffix **–ide** (eg. hydrogen bromide) can be changed by **combining the two names and changing the suffix to –ic acid** (eg. hydrobromic acid).

Another naming system is followed when oxygen is present in the formula. Names that begin with hydrogen and end with the suffix **–ate** (eg. hydrogen carbonate, H_2CO_3) can be changed by **dropping “hydrogen” from the name and changing the suffix to –ic acid** (eg. carbonic acid, $\text{H}_2\text{CO}_3(\text{aq})$).

When the name begins with hydrogen and ends with the suffix **–ite** (eg. hydrogen sulphite, H_2SO_3), then the name can be changed by **dropping hydrogen and changing the suffix to –ous acid** (eg. sulphurous acid, $\text{H}_2\text{SO}_3(\text{aq})$).

Bases generally have OH on the right hand side of their chemical formulas. Common names of bases include sodium hydroxide (NaOH) and magnesium hydroxide ($\text{Mg}(\text{OH})_2$).